

Roll No. ....

Total Pages : 3

**BT-2/M-20**

**32011**

CHEMISTRY

Paper-CH-101E

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *five* questions in all, selecting atleast *one* question from each Unit. All questions carry equal marks.

**UNIT-1**

1. (a) State second law of thermodynamics. Why there is a need for the 'second law of thermodynamic?  
(b) Derive Gibb's Helmholtz equation.  
(c) Write the Phase Rule equation and explain the meaning of the terms involved. Derive an equation of the phase rule. [7,5,8]
2. (a) Derive 'Clausius-Clapeyron equation. Write its significance.  
(b) What is meant by eutectic system? Explain Lead-Silver (Pb-Ag) Eutectic systems by giving its phase diagram.  
(c) Derive an expression for entropy change of an ideal gas. [6,8,6]

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[P.T.O.]

## UNIT-II

3. (a) Explain the term Hardness of water. What are the unit of hardness? Give relation between all units.
- (b) What is scale and sludge formation? How do they cause harm to the boiler and how are they avoided ?
- (c) What is alkalinity of water and how is it determined? Write a method to get rid of alkalinity. [5,7,8]
4. (a) Describe the steps in treatment of municipal water for domestic use.
- (b) Explain the ion-exchange process of softening of hard water. What are the advantages of this method over other water-softening processes?
- (c) Discuss the method of desalination of brackish water using 'Reverse Osmosis'. [7,8,5]

## UNIT-III

5. (a) What is meant by corrosion? Explain the mechanism of wet or electrochemical corrosion. Explain giving an example.
- (b) Discuss various factors effecting corrosion.
- (c) Explain how corrosion can be avoided by proper design, cathodic protection and protective coating? [8,5,7]

6. (a) What are lubricants? Discuss the mechanism of lubrication,
- (b) Explain the following terms :
- (i) Flash Point
  - (ii) Fire Point
  - (iii) Pour Point
  - (iv) Acid Value
  - (v) Consistency Drop Point.
- (c) Explain the role of additives in improving the properties of a lubricant. Give examples of various additives alongwith their effect on lubricant which is meant to be used under different conditions. [8,5,7]

#### UNIT-IV

7. (a) Discuss the preparation, properties and applications of PVA.
- (b) What is TGA? Write down its significance in analysis of polymers.
- (c) What is the effect of structure of polymer on its properties? Explain. [8,7,5]
8. (a) To which class of polymers UF belongs? Write down its method of preparation, properties and applications.
- (b) What do you understand by DTA? Give its significance.
- (c) Discuss the technique of flame photometry used in determining the concentration of ions. [8,6,6]